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Job No.: CTCE/BBMP/KNK/W.No.09/WMM/Gradation/2016-17 05.09.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. K. Nithin Kumar,** Contractor, Bangalore.

Name of Work : Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015

Date of Testing : 05.09.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **7380**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	125	125	1.7	98.3	95-100
22.4	2515	2640	35.8	64.2	60-80
11.2	1250	3890	52.7	47.3	40-60
4.75	1050	4940	66.9	33.1	25-40
2.36	990	5930	80.4	19.6	15-30
0.600	650	6580	89.2	10.8	8-22
0.075	600	7180	97.3	2.7	0-8

Note:

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Job No.: CTCE/BBMP/KNK/W.No.09/WMM/AIV/2016-17 05.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	05.09.2016

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	384	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	355	360	
4	Aggregate Impact value = percent fines	22.40	22.25	
	100* (W_2/W_1)%			22.32

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/KNK/W.No.09/WMM/S-T/2016-17 05.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of Work	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	05.09.2016

Result : Flakiness Index = **12.65%**

Elongation Index = **13.84%**

Result : Combined Flakiness & Elongation index **26.49%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Job No: CTCE/BBMP/KNK/W.No.09/BC/Bitumen/2016-17 27.09.2016

BITUMEN CONTENT DETERMINATION OF BITUMINOUS CONCRETE MIX

As per IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
SAMPLE I/D	A.P.C Layout 4th Cross and other roads in Ward No.09
DATE OF TESTING	27.09.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	470	469
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	30	31.00
7. Bitumen content in %	6.00	6.20
8. Average	**6.10**	

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Job No: CTCE/BBMP/KNK/W.No.09/BC/Bitumen/2016-17 27.09.2016

BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

As Per IS 2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
SAMPLE I/D	A.P.C Layout 4th Cross and other roads in Ward No.09
DATE OF TESTING	27.09.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	46.25	9.84	9.84	90.16	79-100
9.5	33.23	7.07	16.91	83.09	70-88
4.75	75.48	16.06	32.97	67.03	53-71
2.36	62.15	13.22	46.19	53.81	42-58
1.18	43.23	9.20	55.39	44.61	34-48
0.6	56.58	12.04	67.43	32.57	26-38
0.3	42.12	8.96	76.39	23.61	18-28
0.15	36.25	7.71	84.10	15.90	12-20
0.075	42.15	8.97	93.07	6.93	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	33.52	7.15	7.15	92.85	79-100
9.5	44.75	9.54	16.69	83.31	70-88
4.75	67.12	14.31	31.00	69.00	53-71
2.36	66.35	14.15	45.15	54.85	42-58
1.18	72.14	15.38	60.53	39.47	34-48
0.6	44.52	9.49	70.02	29.98	26-38
0.3	32.69	6.97	76.99	23.01	18-28
0.15	44.58	9.51	86.50	13.50	12-20
0.075	40.25	8.58	95.08	4.92	4-10

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/AIV/2016-17 05.10.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	05.10.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	383	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	82	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.08	22.19	**21.64**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/Shape_T/2016-17 : 05.10.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of Work	: Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 05.10.2016

Result : Flakiness Index = **11.59%**

Elongation Index = **13.11%**

Result : Combined Flakiness & Elongation index **24.70%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/Stripping/2016-17 05.10.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of the work	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	05.10.2016

Type of binder : 60/70
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.23	96.77
2	3.1		
3	3.2		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/Sp_Wa/2016-17 05.10.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	05.10.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2005	2003	2006	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1250	1248	1251	
4	Weight of saturated surface dry aggregate in air	W_3 g	2016	2018	2020	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	766	770	769	
6	Weight of oven dried aggregate	W_4 g	2001	2002	2004	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.612	2.600	2.606	2.606
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.664	2.655	2.661	2.660
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.75%	0.80%	0.80%	0.78%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/Bit/2016-17 05.10.2016

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
SAMPLE I/D	A.P.C Layout 4th Cross and other roads in Ward No.09
DATE OF TESTING	05.10.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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Job No.: CTCE/BBMP/KNK/W.No.09/SDBC/Bit/2016-17 05.10.2016

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K. Nithin Kumar,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to A.P.C Layout 4th Cross and other roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/233/2014-15 Dated: 20.01.2015
SAMPLE I/D	A.P.C Layout 4th Cross and other roads in Ward No.09
DATE OF TESTING	05.10.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.32	5.54	5.54	94.46	90-100
4.75	261.4	55.03	60.57	39.43	35-51
2.36	55.45	11.67	72.25	27.75	24-39
1.18	36.23	7.63	79.87	20.13	15-30
0.3	35.47	7.47	87.34	12.66	9-19
0.075	38.12	8.03	95.37	4.63	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	34.15	7.20	7.20	92.80	90-100
4.75	256.8	54.18	61.38	38.62	35-51
2.36	54.27	11.45	72.83	27.17	24-39
1.18	36.23	7.64	80.47	19.53	15-30
0.3	35.48	7.49	87.96	12.04	9-19
0.075	32.69	6.90	94.86	5.14	3-8

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